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ABSTRACT

This study was undertaken to compare the motor performance age and race differences between black and caucasian boys ages six to nine. One hundred and twenty subjects were administered 25 test items which measured (a) muscular strength, (b) muscular endurance, (c) cardio-respiratory endurance, (d) speed, (e) power, (f) agility, (g) balance, and (h) flexibility. Results indicated that relative to age level differences, the motor variables of power, balance, speed, and agility change significantly from year to year, while for measures of muscular strength and endurance the pattern of change is not as clear cut. Comparisons for cardiorespiratory endurance and flexibility did not produce significant differences. An analysis of the comparisons for race differences found black subjects superior to caucasian subjects on eight test items and caucasian subjects superior on two items. All other comparisons between races were not significant. (PB)

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"MOTOR PERFORMANCE AGE AND RACE DIFFERENCES BETWEEN BLACK AND CAUCASIAN BOYS SIX TO NINE YEARS OF AGE"*

by

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While educators continue to speculate, little research has been conducted to determine the motor performance differences which may exist between children in the primary grades and between children of different races. Prior investigations have been satisfied to compare young children on fine motor tasks and have ignored basic fitness performance components because of the idea that fitness testing was something to be started in the upper elementary grades. One only needs to examine existing motor performance test batteries to realize that children in grades K through 3 are usually not included. Additionally, those test batteries that may have been developed for this population generally contain test items of very doubtful validity. With the inception of perceptual motor testing, the problem of using less than valid test items has increased to the point that one rarely finds validity coefficients published with test items or test batteries particularly for those used with children in the lower elementary grades.

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The reasons why we have failed to conduct more motor performance testing programs for children between 5 and 9 years of age are many and varied. One segment of our profession still holds firm to the belief that children this young are not capable of performing many of the same types of tasks that older children are required to perform. This has been particularly evident when considering cardio-respiratory fitness testing, and, while research points to the contrary, many physical education personnel still believe that endurance performance will in some way damage the heart of a young child. In addition to this misconception, investigators have not found it convenient to test very young children because of the time involved and the maturational level of the subjects. Subjects between 5 and 9 years of age are generally more difficult to work with because of their inability to understand many test instructions as written and their lack of experience with the test items. Still another concern voiced by physical education personnel is the suspected lack of variability between children of this age level relative to most motor performance tasks. This line of reasoning has recently been refuted by the Medford Boys Growth Study which found marked individual differences between boys at each age between 7 and 18 years relative to maturity, structure, strength, and motor ability variables.

STATEMENT OF THE PROBLEM

The purpose of this investigation was to compare the motor performance characteristics of boys between the ages of 6 and 9 years and to compare the motor performance of Black and Caucasian subjects of this same age.

RESEARCH PROCEDURES

The subjects for this investigation were 120 randomly selected boys between the ages of 6 and 9 years with 20 Black and 20 Caucasian subjects selected at each age.

Each subject was administered 25 test items which previous research had indicated as valid, reliable, and objective measures of muscular strength, muscular endurance, cardio-respiratory endurance, speed, power, agility, balance, and flexibility. The test items utilized in this investigation were as follows: Vertical Jump, Standing Broad Jump, Modified Pull-Ups, Modified Push-Ups, Grip Strength, Leg Lift, Shoulder Extension Strength, Knee Extension Strength, Ankle Plantar Flexion Strength, Bent Arm Hang, 50-yard dash, 10-yard Dash, Dodging Run, Illinois Agility Run, 6-second Run, Wrist Flexion and Extension Flexibility, Trunk-Hip Flexion and Extension Flexibility, Leg Flexion and Extension Flexibility, Wells Sit and Reach, Bass Balance-Lengthwise, Bass Balance-Crosswise, Railwalk Forward, Time Limit Shuttle Run, 300-yard Run, and the 600-yard Run.

Following the completion of the testing program the data were statistically analyzed by application of a 2 X 3 factorial design using the age level of the subjects as the rows and race as the columns. For F-ratios found to be significant at the .05 level, the means were compared by using the Scheffe method of multiple comparison.

RESULTS

Application of analysis of variance procedures to the 2 X 3 factorial design revealed all F-ratios for age level comparisons

to be significant at the .05 level of significance. The results of the multiple comparisons completed for the age level comparisons are portrayed in Table 1 and Figure 1.

FIGURE 1

SCHEFFE MULTIPLE COMPARISONS FOR AGE LEVEL

	None Significant	Ages 6-7 Sign.	Ages 6-8 Sign.	Ages 7-8 Sign.	All
Vertical Jump					x
Standing Broad Jump			x		
Modified Pull-Ups			x		
Modified Push-Ups	x				
Bent Arm Hang	x				
Grip Strength		x	x		
Leg Lift	x				
Shoulder Extension		x	x		
Knee Extension		x	x		
Ankle Plantar Flexion			x		
Bass Lengthwise			x		
Bass Crosswise					x
Railwalk					x
50-yard Dash					x
10-yard Dash					x
Dodging Run					x
6-second Run					x
Illinois Agility Run					x
Time Limit Shuttle Run					x
300-yard Run	x				
600-yard Run	x				
Wrist Flexion-Extension	x				
Trunk-Hip Flexion-Extension	x				
Leg Flexion-Extension	x				
Wells Sit and Reach	x				

For the race differences, the data are presented in Table 1 and Figure 2.

FIGURE 2

MOTOR PERFORMANCE COMPARISONS BETWEEN BLACK AND CAUCASIAN BOYS

	No Significance	Black Superior	White Superior
Vertical Jump		x	
Standing Broad Jump		x	
Modified Pull-Ups	x		
Modified Push-Ups	x		
Bent Arm Hang		x	
Grip Strength		x	
Leg Lift	x		
Shoulder Extension	x		
Knee Extension	x		
Ankle Plantar Flexion	x		
Bass Lengthwise	x		
Bass Crosswise	x		
Railwalk	x		
50-yard Dash		x	
10-yard Dash		x	
Dodging Run	x		
6-second Run		x	
Illinois Agility Run	x		
300-yard Run		x	
600-yard Run	x		
Wrist Flexion and Extension			x
Trunk-Hip Flexion-Extension	x		
Leg Flexion-Extension			x
Wells Sit and Reach	x		

Observation of the F-ratios for the interaction effect found none to be statistically significant at the .05 level of significance.

SUMMARY

From the foregoing presentation of results it can be concluded that relative to age level differences, the motor performance variables of power, balance, speed, and agility, generally, change significantly from year to year while for measures of muscular strength and endurance the pattern of change is not as clear cut.

Significant differences were noted between ages 6-7 and 6-8 for the gross muscular strength measures with the exception of the leg lift. For muscular endurance the only significant difference observed was between ages 6 and 8 years for modified pull-ups; the other comparisons were not significant. The comparisons for cardiorespiratory endurance and flexibility were not significant indicating that these variables change little between ages 6 and 9 years.

An analysis of the comparisons for race differences found the Black subjects superior to the Caucasian subjects on the vertical jump, standing broad jump, bent arm hand, grip strength, 10 yard dash, 50 yard dash, 6 second run, and the 300 yard run. The Caucasian subjects were superior only on the flexibility variables of wrist flexion-extension and leg flexion-extension. All other comparisons between races were not significant.

TABLE 1

F-RATIOS FOR AGE AND RACE COMPARISONS

VARIABLE	AGE LEVEL		RACE		INTERACTION	
	F-RATIO	PROB.	F-RATIO	PROB.	F-RATIO	PROB.
Vertical Jump	18.46	0.01	10.82	0.01	1.95	0.15
Standing Broad Jump	26.77	0.01	4.97	0.03	0.70	0.50
Modified Pull-ups	8.81	0.01	0.78	0.38	2.50	0.08
Modified Push-ups	1.78	0.17	0.54	0.47	0.49	0.62
Bent Arm Hang	7.87	0.01	8.33	0.01	2.50	0.08
Grip Strength	32.92	0.01	9.51	0.01	1.30	0.28
Leg Lift	35.94	0.01	1.40	0.23	1.20	0.31
Shoulder Extension Strength	18.27	0.01	0.09	0.76	3.26	0.06
Knee Extension Strength	24.75	0.01	0.38	0.55	0.18	0.83
Ankle Plantar Flexion Strength	33.35	0.01	0.18	0.68	0.22	0.80
Wrist Flex.-Ext. Flexibility	0.70	0.50	7.96	0.01	0.24	0.79
Trunk-Hip Flex.-Ext. Flexibility	5.33	0.01	3.10	0.08	0.31	0.74
Leg Flex.-Ext. Flexibility	1.34	0.27	11.46	0.01	1.25	1.29
Wells Sit and Reach	2.30	0.10	3.18	0.07	0.36	0.71
Bass Lengthwise Balance	10.43	0.01	0.01	0.95	0.59	0.57
Bass Crosswise Balance	6.69	0.01	1.01	0.32	0.64	0.53
Railwalk	9.90	0.01	0.21	0.66	0.11	0.90
6-second Run	29.10	0.01	8.75	0.01	0.66	0.19
10-yard Dash	18.41	0.01	9.52	0.01	1.40	0.25
50-yard Dash	28.33	0.01	10.73	0.01	1.05	0.36
Time Limit Shuttle Run	20.93	0.01	0.05	0.82	0.04	0.96
Dodging Run	28.10	0.01	2.30	0.13	1.92	0.15
Illinois Agility Run	47.82	0.01	0.12	0.73	0.96	0.39
300-yard Run	21.12	0.01	3.86	0.05	0.19	0.83
600-yard Run	7.24	0.01	1.01	0.32	0.53	0.59

TABLE 2

MEAN PERFORMANCE FOR AGE LEVEL AND RACE

VARIABLE	AGE 6	AGE 7	AGE 8	SCHEFFE VALUE	RACE CAU.	RACE BLACK
Vertical Jump	6.48	7.84	9.04	.44	7.22	8.35
Standing Broad Jump	40.53	48.08	51.26	5.63	45.25	47.99
Modified Push-ups	10.16	11.13	16.25	6.03	11.95	13.08
Modified Push-ups	13.45	13.04	15.81	6.25	13.63	14.58
Bent Arm Hang	11.77	12.65	20.83	15.72	12.12	18.05
Grip Strength	17.80	25.85	30.90	6.57	22.80	26.90
Leg Lift	171.75	252.75	347.00	1061.66	247.17	267.17
Shoulder Extension Strength	16.55	21.33	22.68	2.80	20.05	20.32
Knee Extension Strength	23.58	29.38	34.08	5.56	28.63	29.38
Ankle Plantar Flexion Strength	36.53	47.78	57.10	15.80	47.57	46.70
Wrist Flex.-Ext. Flexibility	117.08	119.43	121.48	34.45	123.62	115.03
Trunk-Hip Flex.-Ext. Flexibility	157.13	158.08	168.43	36.60	158.45	163.97
Leg Flex.-Ext. Flexibility	116.05	116.35	119.78	15.97	120.90	113.88
Wells Sit and Reach	11.91	10.93	11.08	.60	10.95	11.67
Bass Lengthwise Balance	8.45	10.78	15.06	5.36	11.39	11.46
Bass Crosswise Balance	4.48	5.47	6.12	.51	5.17	5.54
Railwalk	2.98	4.15	5.95	1.13	4.48	4.23
6-second Run	29.20	31.05	33.30	.72	30.53	31.83
10-yard Dash	3.32	3.05	2.84	.02	3.17	2.97
50-yard Dash	10.88	9.97	9.37	.10	10.34	9.81
Time Limit Shuttle Run	28.48	30.08	31.60	.58	30.00	30.10
Dodging Run	20.02	23.66	22.23	.65	23.65	24.28
Illinois Agility Run	27.30	24.74	22.93	.50	25.06	24.93
300-yard Run	101.73	84.14	81.24	28.87	91.77	86.30
600-yard Run	211.36	192.13	183.86	136.86	198.83	192.74